USDA NRCS

January 2000

Aging Dams

United States Department of Agriculture

Overview

Upstream Flood Control Dams: A Growing National Concern

More than 50 years ago, the U.S. Department of Agriculture was first authorized by Congress to help local communities with upstream flood control and watershed protection.

Today, there is growing national interest and concern that many of the early upstream flood control dams that resulted (from the Flood Control Act of 1944 and the Watershed Protection and Flood Prevention Act of 1954) are at or near the end of their 50-year design life and pose a public safety issue.

Most of these small, upstream flood control dams resemble large farm ponds. They are part of a full complement of land and water conservation practices on private lands aimed at the basic conservation principle of holding the raindrop high in the watershed as close to where it strikes the land as possible.

The Small Watershed Program has a 50-year tradition of protecting lives and property and conserving natural resources. Administered by the Natural Resources Conservation Service (NRCS), the watershed program assists local communities with technical and financial assistance to take a comprehensive approach to address local natural resource concerns.

Public Safety Concerns

Local communities, with assistance from NRCS, have constructed more than 10,000 upstream flood control dams since 1948. Many of the older small dams have significant rehabilitation needs. Some pose a threat to public safety to those downstream from the dams or who use the reservoirs as a source of drinking water. Other dams have the potential for creating adverse environmental impacts in the same downstream flood-plain that they have been protecting.

Benefits of Watershed Protection Projects

Watershed projects, which are organized and operated by local sponsors, provide flood control, municipal and irrigation water supply, recreation, erosion control, and wildlife habitat enhancement on more than 130 million acres in the nation.

The nation's Small Watershed Program yields annual benefits of more than $800 million annually. Projects reduce flooding to prime farmland, highways, communities, and residences, and conserve natural resources. They are an integral part of communities in every state in the nation. They provide a $14 billion national infrastructure investment and beneficially impact thousands of people's lives every day.

Time Takes Its Toll

Many project areas now are in a far different setting than when they were originally constructed. Population has grown, development has occurred upstream and downstream from the small dams, land use changes have taken place, sediment pools have filled, structural components have deteriorated, and many do not meet state dam safety regulations that have been enacted and revised with more stringent requirements since the dams were built.

Many of these dams lie in upstream agricultural areas and are unknown to most residents who are protected by them. Many are quietly deteriorating as time takes its toll on their components. Unless something is done to rehabilitate or, in some cases, to remove them, they pose a public safety issue.

A recent survey of known rehabilitation needs in 22 states revealed that more than 2,200 dams need rehabilitation at an estimated cost of more than

$540 million. The cost of rehabilitation will only increase with time, as deterioration increases and construction costs go up.

Rehabilitation Opportunities

In addition to addressing human health and safety issues, rehabilitation provides opportunities for communities to provide new benefits, such as adding municipal and irrigation water supplies, firefighting water sources, recreation, and wetland and wildlife enhancements.

All rehabilitated dams will meet all state and federal environmental and safety standards.

In limited cases, where flood control can be achieved by other measures, dams may even be removed and the site restored to natural conditions to the extent possible.

Technological Advances

Today, technology advances, design and construction experience, and updating of design criteria have improved the safety of dams. Design methods are much more sophisticated than when early dams were designed and built.

Emerging technologies can also be applied to help make older dams safer. Robotic cameras can inspect pipes, sediment volume in reservoirs can be determined by seismic investigation, pollutants in the sediment can be determined by chemical testing, and improved flood warning systems can be installed.

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Questions and Answers

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Q. How many small dams have been installed by communities with the assistance of the Natural Resources Conservation Service watershed protection programs?

A. More than 10,000 small dams have been installed in 46 states since 1948 (the four states where watershed dams are not located: Washington, Delaware, Rhode Island, and Alaska).

Q. How old are the small watershed dams?

A. The average age of the 10,000 watershed dams in the nation is 30 years old. Over 250 dams are more than 45 years old (almost 50 are greater than 50 years old). Within the next 10 years, more than 1,300 dams will reach 50 years old.

Q What happens when a dam reaches the end of its life span?

A. Time takes it toll on dams. Reservoirs fill with sediment, metal and concrete deteriorate, land use conditions upstream from the dam change and increase the volume of water being delivered to the site, and many do not meet current dam safety requirements.

Q: Who planned, designed, and constructed the dams?

A: Local communities, with technical and financial assistance from the Natural Resources Conservation Service (formerly the Soil Conservation Service).

Q: Who owns the dams?

A: Local communities, who are the sponsors of the watershed project.

Q: Who is responsible for the annual operations and maintenance of the small dams?

A: Local communities, who are the sponsors of the watershed project.

Q: When a small dam reaches the end of its life span, what options to local communities have?

A: Dams can be rebuilt or rehabilitated so they can function for a long time in the future (100 years or more). General options include raising the dam to provide additional storage or dredging the sediment and replacing metal components. In some cases where flood control is no longer needed downstream, the dam can be removed and the site restored to natural conditions to the extent possible.

Q: If NRCS assists the local community with any of these options, what environmental considerations are there?

A: If USDA assists with rehabilitation of the dams, federal environmental laws must be met, including consideration of environmental and cultural impacts of any proposed work.

Q: What benefits do these small dams provide?

A:
- Flood control—by temporarily detaining runoff that has flowed to the dam and safely releasing it downstream through a pipe through the dam.
- Improved water quality—by settling out contaminants and sediment in the reservoir, thus protecting downstream streams and rivers.

  Water supply—by storing the water during rainy seasons for use by communities or agricultural irrigation later in the year when it is needed for crop production.
- Drinking water—by storing water in the reservoir for use by municipal and industrial entities.
- Fish and wildlife habitat—by improving wetland and vegetative habitat that creates better shelter and food sources.
- Habitat to threatened and endangered species—by creation of special features to enhance and protect threatened and endangered species.
- Wetland habitat—by creating vegetative riparian areas along the upper reaches of the reservoir.
- Restoration of riparian habitat—by providing protection of downstream channel areas that allow vegetative growth and improvement of the riparian areas.
- Recreation for local residents—by providing a source of quality fishing, hunting, picnicking, etc.
- Fire protection in rural communities—by providing a supply of water to be used for fire fighting.

Q: What level of flood protection do most small dams provide?

A: Most dams provide protection of downstream areas from storms that occur less than once every 25 years.

Q: What happens when a greater storm event occurs?

A: Each dam is designed with an auxillary spillway constructed around one end of the dam that safely conveys excess flow around the dam, thus protecting it from overtopping and failure.

Q: How long were the dams designed to function?

A: The majority of the 10,000 dams were designed with a 50-year design life.

Q: What is the typical size of these small dams?

A: Generally, small watershed dams are between 25 and 60 feet in height. These dams create lakes that range in size from a few acres to several hundred acres in size.

Q: What materials are the small dams built with?

A: Most dams are built with compacted earth with metal or concrete pipes that draw down water that is temporarily retained behind the dams after storms.

Q: Where are the small dams located on the landscape?

A: Typically, small watershed dams are located on drainageways that are generally dry or have very little flow except following rainstorms. Very few dams are placed on larger drainageways that actually flow year-round.

Q: Have any of the small dams built under the Small Watershed Program ever failed?

A: To date, no dams have failed that have resulted in loss of life or property. However, some have had significant problems that have been corrected before a catastrophic failure or tragedy has occurred. These occurrences will undoubtedly increase as the dams get older.

Q: How much water do these small dams typically hold?

A: The lakes created by these dams typically hold between 100 and 5,000 acre-feet of water.

Q: How much floodwater do these small dams typically detain?

A: These dams contain as much as several thousand acre-feet of floodwater before it is slowly released downstream after a rainstorm.

Q: How long is floodwater typically detained behind these small dams?

A: Floodwater is typically detained from 5 to 20 days behind the dams after a rainstorm.

Q: Are local communities, farmers, and ranchers required to install soil and water conservation practices in the watershed above each of the small dams?

A: Conservation practices are required to be installed within the drainage areas above the dams to protect them from excessive soil erosion and sedimentation. Many of these conservation practices are also aging and must be rebuilt. A minimum of 50 percent of the needed conservation practices and management techniques must be implemented prior to a dam being constructed or rebuilt.